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Health and Environmental Profile for Busan 77

(U.S.) Environmental Protection Agency
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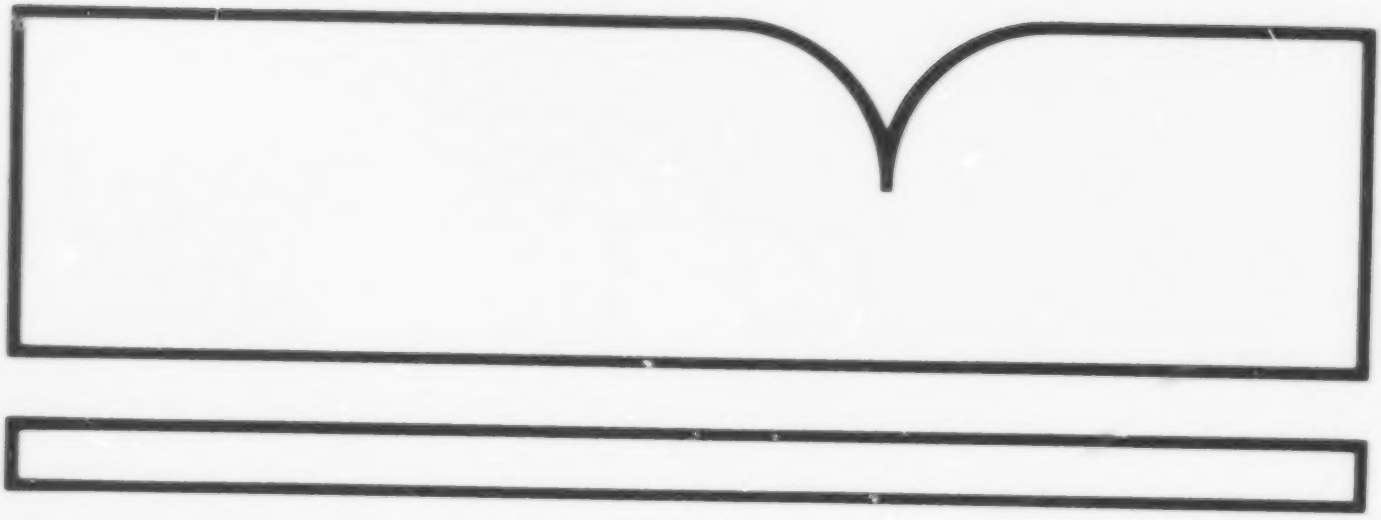

U.S. Department of Commerce
National Technical Information Service
NTIS

EPA/600/X-84/228
January 1984

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HEALTH AND ENVIRONMENTAL EFFECTS PROFILE FOR BUSAN 77

ENVIRONMENTAL CRITERIA AND ASSESSMENT OFFICE
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16. ABSTRACT

The Health and Environmental Effects Profile for Busan 77 was prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Solid Waste to support listings of hazardous constituents of a wide range of waste streams under Section 3001 of the Resource Conservation and Recovery Act (RCRA). Both published literature and information obtained from Agency program office files were evaluated as they pertained to potential human health, aquatic life and environmental effects of hazardous waste constituents.

Quantitative estimates have been presented provided sufficient data are available. Existing data are insufficient to determine an Acceptable Daily Intake (ADI) or a carcinogenic potency factor for Busan 77.

17. KEY WORDS AND DOCUMENT ANALYSIS

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PREFACE

Health and Environmental Effects Profiles (HEEPs) are prepared for the Office of Solid Waste by the Office of Health and Environmental Assessment. The HEEPs are intended to support listings of hazardous constituents of a wide range of waste streams under Section 3001 of the Resource Conservation and Recovery Act (RCRA). Both published literature and information obtained from Agency program office files are evaluated as they pertain to potential human health, aquatic life and environmental effects of hazardous waste constituents. The literature searched and the dates of the searches are included in the section titled "Appendix: Literature Searched."

Quantitative estimates are presented provided sufficient data are available. For systemic toxicants, these include, Acceptable Daily Intakes (ADIs) for chronic exposures. An ADI is defined as the amount of a chemical to which humans can be exposed on a daily basis over an extended period of time (usually a lifetime) without suffering a deleterious effect. In the case of suspected carcinogens, ADIs are not estimated in this document series. Instead, a carcinogenic potency factor or q_1^* is provided. These potency estimates are derived for both oral and inhalation exposures where possible. In addition, unit risk estimates for air and drinking water are presented based on inhalation and oral data, respectively.

The first draft of this document was prepared by Syracuse Research Corporation under EPA Contract No. 68-03-3228. The document was subsequently revised after reviews by staff within the Office of Health and Environmental Assessment: Carcinogen Assessment Group, Reproductive Effects Assessment Group, Exposure Assessment Group, and the Environmental Criteria and Assessment Office in Cincinnati.

The HEEPs will become part of the EPA RCRA docket.

ACKNOWLEDGEMENTS

The initial draft of this report was prepared by Syracuse Research Corporation under Contract No. 68-03-3228 for U.S. EPA's Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH. Dr. Christopher DeRosa was the Technical Project Monitor and Helen Ball was the Project Officer. The final documents in this series were prepared for the Office of Solid Waste, Washington, DC.

Scientists from the following U.S. EPA offices provided review comments for this document series:

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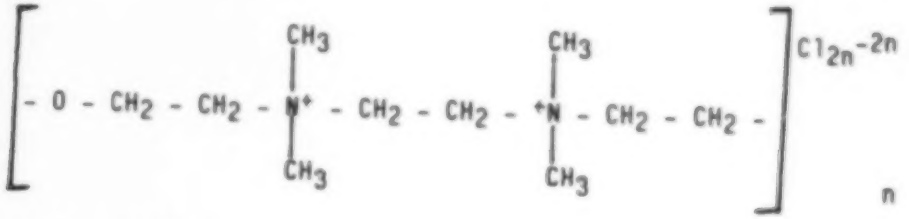
LIST OF ABBREVIATIONS

LC_{50}	Concentration lethal to 50% of recipients
LD_{50}	Dose lethal to 50% of recipients
TLV	Threshold limit value

1. INTRODUCTION

1.1. STRUCTURE AND CAS NUMBER

Busan 77 is the common name for poly(oxyethylene(dimethylimino)-ethyl-(dimethylimino)-ethylene dichloride. It is also known as Bualta, WSCP, Ionene and Bubond 60 (NIOSH, 1983; Voets et al., 1976). The structure of Busan 77 is shown below (Voets et al., 1976):



The Chemical Abstracts Services (CAS) Registry number for this compound is 31512-74-0.

Empirical formula: $(C_{10}H_{24}N_2O \cdot Cl_2)n$

Molecular weight: depends on degree of polymerization; it may be on the order of 1500-4000 (Bortel et al., 1981).

1.2. PHYSICAL AND CHEMICAL PROPERTIES

Busan 77 is a water soluble quaternary ammonium polymer. Pertinent data regarding the physical and chemical properties of Busan 77 were not located in the available literature. (See the Appendix for sources searched. Additional classified data are available for this compound. A more complete explanation is given in Chapter 8.)

1.3. PRODUCTION DATA

Busan 77 is produced by Buckman Laboratories, Memphis, Tennessee (Voets et al., 1976). The production volume was not available. (See the Appendix for sources searched. Additional classified data are available for this compound. A more complete explanation is given in Chapter 8.)

1.4. USE DATA

Busan 77 has been used commercially or experimentally as a microbicide, growth regulator, algaestat and water treatment chemical, and in polyelectrolyte formulations. (See the Appendix for sources searched. Additional classified data are available for this compound. A more complete explanation is given in Chapter 8.)

2. ENVIRONMENTAL FATE AND TRANSPORT PROCESSES

Few data regarding the environmental fate of Busan 77 were located.

Since Busan 77 is used as a water treatment chemical in cooling systems, it may be released to the atmosphere as an aerosol from cooling towers. Its fate in the atmosphere is unknown.

Busan 77 was reported to undergo 10-50% cometabolic degradation after aerobic incubation for 2 weeks with activated sludge at 22°C (Voets et al., 1976). No observable degradation occurred when the compound was incubated aerobically with mineral solution or anaerobically with activated sludge or mineral solution (Voets et al., 1976). Busan 77 was probably degraded by mixed flora, as no single bacterium using it as a carbon source could be isolated. (See the Appendix for sources searched. Additional classified data are available for this compound. A more complete explanation is given in Chapter 8.)

3. EXPOSURE

Busan 77 may be released to the atmosphere as an aerosol from cooling towers (see Chapter 2). No quantitative exposure data were located. (See the Appendix for sources searched. Additional classified data are available for this compound. A more complete explanation is given in Chapter 8.)

4. PHARMACOKINETICS

Pertinent data regarding the absorption, distribution, metabolism or excretion of Busan 77 were not found in the available literature. (See the Appendix for sources searched. Additional classified data are available for this compound. A more complete explanation is given in Chapter 8.)

5. EFFECTS

5.1. CARCINOGENICITY

Pertinent data regarding the carcinogenicity of Busan 77 were not located in the available literature. It is not scheduled for testing by the National Toxicology Program (NTP, 1983).

5.2. MUTAGENICITY

Pertinent data regarding the mutagenicity of Busan 77 were not located in the available literature.

5.3. TERATOGENICITY

Pertinent data regarding the teratogenicity of Busan 77 were not located in the available literature.

5.4. OTHER REPRODUCTIVE EFFECTS

Pertinent data regarding other reproductive effects of Busan 77 were not located in the available literature.

5.5. CHRONIC AND SUBCHRONIC TOXICITY

Pertinent data regarding the chronic and subchronic toxicity of Busan 77 were not located in the available literature. (See the Appendix for sources searched. Additional classified data are available for this compound. A more complete explanation is given in Chapter 8.)

5.6. OTHER RELEVANT INFORMATION

Busan 77 has an acute oral LD_{50} of 1850 mg/kg in rats (NIOSH, 1983). (See the Appendix for sources searched. Additional classified data are available for this compound. A more complete explanation is given in Chapter 8.)

6. ACUTE TOXICOLOGY

6.1. ACUTE TOXICITY

The acute lethal concentrations of Busan 77 were tested in harlequin fish, Rasbora heteromorpha (Tooby et al., 1975). The 24, 48 and 96-hour LC_{50} values, determined in a constant-flow system, were 0.66, 0.39 and 0.17 mg/ℓ, respectively. Based on these acute-testing data, a 3-month LC_{50} was estimated to be 0.01 mg Busan 77/ℓ. (Tooby et al., 1975).

6.2. CHRONIC EFFECTS

Pertinent data regarding the effects of chronic Busan 77 exposure to aquatic organisms were not located in the available literature.

6.3. PLANT EFFECTS

The use of Busan 77 as an algicide has been described by Pera and Johnson (1973). Its use at 10 mg/ℓ supresses algal growth. More specifically, Matulova (1981) reported in an abstract of a Czechoslavakian study that Busan 77 at 3.0 and 1.5 mg/ℓ was effective in completely inhibiting the growth of Scenedesmus quadricauda and Chlamydomonas engametos, respectively.

6.4. RESIDUES

Pertinent data regarding the occurrence, persistence or bioaccumulation of Busan 77 in the aquatic environment were not located in the available liteature.

6.5. OTHER RELEVANT INFORMATION

Additional data pertinent to the aquatic toxicity of Busan 77 were not located in the available literature.

7. EXISTING GUIDELINES AND STANDARDS

7.1. HUMAN

No existing guidelines or standards were located in the available literature. The American Conference of Governmental Industrial Hygienists has not established a TLV for Busan 77 (ACGIH, 1980, 1982).

7.2. AQUATIC

Guidelines and standards for the protection of aquatic organisms from the toxic effects of Busan 77 have not been established.

8. RISK ASSESSMENT

Pertinent data on which a risk assessment could be based were not located in the available literature. The only information available was an acute oral LD_{50} value of 1850 mg/kg for rats (NIOSH, 1983).

Statements concerning available literature in this document refer to published, quotable sources and are in no way meant to imply that confidential data, which this document could not address, are not in existence. These data, which are considered Confidential Business Information (CBI), are available in summary form as a CBI Appendix that can be accessed by individuals with appropriate clearance. However, the additional data reviewed in the CBI Appendix to this document were insufficient to derive a q_1^* or an ADI for Busan 77.

9. REFERENCES

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Voets, J.P., P. Pipyn, P. Van Lancker and W. Verstraete. 1976. Degradation of microbicides under different environmental conditions. J. Appl. Bacteriol. 40(1): 67-72.

APPENDIX:

LITERATURE SEARCHED

This profile is based on data identified by computerized literature searches of:

CA SEARCH (Files 308, 309, 310, 311, 320)
TOXLINE
MEDLINE
RTECS
SCI SEARCH
OHM TADS
STORET
SRC Environmental Fate Data Bases
SANSS
AQUIRE

These searches were conducted in July and August, 1983. In addition, hand searches were made of Chemical Abstracts (Collective Indices 7 and 8th), and the following secondary sources were reviewed:

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